



no. 6

## VACCINATION

AND THE

### Causes of the Prevalence of Small-Pox in New York

IN 1853-4.

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THE subject of the present article is replete with interest to the medical inquirer, and of vast importance to the well-being of society. Its importance is at once manifest, when the startling announcement is made, that for the year ending March 1st, 1854, nine hundred and twenty-nine deaths occurred in the city of New-York, from a disease that is confessedly more under the control of man than any other of equal gravity; five hundred and fifty-two of which occurred during the last third of the year.\* It is therefore a question for serious investigation, which I hope to conduct in a spirit of candor, and with an earnest desire to arrive at truth, What are the causes that have operated to produce the recent extensive prevalence of small-pox in our midst? If this can be satisfactorily determined, we may be enabled, to some extent at least, by removing the source, to obviate the evil in future. That it is not due to the want of the anti-variolous power claimed for vaccination, we have the most indubitable evidence, for there is no subject in the vast range of medical investigation supported by a larger cloud of evidence than the protective value of Jenner's discovery.

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\* These statistics have been obtained through the courtesy of Dr. Hyatt, from the records at the City Inspector's Office, which are not yet published for the last year. The number of deaths stated includes those from varioloid.

Still, it is not *now* believed that it will ever be the means of utterly extirpating small-pox from the earth, (this opinion has recently been expressed by Dr. Tuthill in his valedictory address at the New-York Med. College,) because there are undoubted proofs of its occasional spontaneous origin. Four cases of this kind are reported by Wm. D. Purple, M. D., one by E. C. Banks, M. D., and two by the Editors of the *Phila. Med. Examiner.* (Vide *N. Y. Jour. of Med.*, vol. vii., N. S., 1851.)

In our investigation into the causes of the recent prevalence of small-pox, we have been led to the unexpected conclusion, that it is due, in a great measure, *first*, to the neglect of vaccination. The truth of this proposition is evinced by the large proportion of deaths that have occurred in children under the age of five years. It is a well-known fact, admitted by the most reliable authorities, that a death by small-pox in a *vaccinated* child is an exceedingly rare event. Indeed, the late Dr. Gregory of London, whose ample experience entitles his opinions to great respect, declared, in a discussion before the Royal Med. and Chirurg. Society, (reported in the *London Lancet*, March 8th, 1851,) "that cases of small-pox after vaccination, up to the *fifteenth year*, were very rare indeed."

The following Table exhibits the proportion of deaths under five years, in the city of New-York, to the whole number of deaths from small-pox and varioloid, for the five years ending 1st January, 1854:—

Year	Total Deaths from Small-pox.	Deaths under Five years.	Percentage of Deaths under five.
1849 . . . . .	372	223	60
1850 . . . . .	241	147	61
1851 . . . . .	586	343	59
1852 . . . . .	516	383	74.2
1853 . . . . .	681	458	67.3
Totals . . . . .	2,396	1,554	64.3

From these statements it appears, that of all the deaths

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from small-pox which occur in New-York, a fraction more than 64 per cent. take place under the age of five, or during the period in which it is allowed by all authorities that deaths after vaccination rarely occur. Hence, we must conclude, that this large per cent. of deaths took place in the unvaccinated, and there can be but little doubt that many of the deaths among older persons also occurred in the unprotected.

I have recently seen in the Small-pox Hospital on Black-well's Island, through the kindness of Dr. Sanger, the resident physician, 13 boys, from nine to fifteen years of age, who had been sent there from the House of Refuge, with small-pox and varioloid, six or seven of whom had never been vaccinated. Dr. Parkinson, vaccine physician to the New-York Dispensary, has informed me that almost all the cases of small-pox treated by the outdoor physicians of that institution have occurred in those who have not been vaccinated. Dr. P. has also told me that about one-sixth of the individuals vaccinated by him are upwards of three years old; and as his vaccinations average 3,000 annually, it will be seen, that at this institution alone, 500 children, more than three years of age, are presented every year, who have been exposed unprotected to the ravages of the small-pox.

Further evidence of the neglect of vaccination is afforded by a comparison of the mortality from small-pox, in those countries where it is made compulsory by legislation, with the mortality in New-York, and other places, where no such regulation exists. The following tables, extracted from the *Report on Small-pox and Vaccination* made to the London Epidemiological Society, March 26, 1853, exhibit the results of these opposite modes of treatment, which are of so much interest that they are presented entire:—

(A.)—Table showing the mortality in various places in *England*, *Scotland*, and *Ireland*, from small-pox, as compared with the total mortality, for ten years, ending 1850 or 1851:

	Deaths from Small- pox.	Deaths from all Causes		Deaths from Small- pox.	Deaths from all Causes
London -----	16. per	1,000	Greenock -----	34.6 per	1,000
Birmingham -----	16.6 "	"	Glasgow -----	36.	"
Leeds -----	17.5 "	"	Dublin -----	25 66	"
Paisley -----	18.	"	Cork -----	39 5	"
Edinburgh -----	19.4	"	Galway -----	35.	"
Liverpool -----	21.	"	Limerick -----	41.	"
Dundee -----	24.2	"	Connaught { 10 yrs. endg. 1841	60.	"
Perth -----	25.	"	All Ireland } 49.	49.	"
England and Wales (8 years) -----	21.9	"			

(B.)—Table showing the mortality from small-pox in various countries in which vaccination is directly or indirectly compelled, as compared with the total mortality for various periods, stated in the “Tables exhibiting the Mortality from Small-pox in various Countries” at the end of this Report:

	Deaths from Small- Pox.	Deaths from all Causes.		Deaths from Small- Pox.	Deaths from all Causes.
Westphalia -----	6 per	1,000	Trieste -----	5.15 per	1,000
Saxony -----	8.33	"	Bohemia -----	2.	"
Rhenish Provinces -----	3 75	"	Lombardy -----	2.	"
Silesia (Prussian) -----	5.25	"	Venice -----	2 2	"
Pomerania -----	7.75	"	Sweden -----	2.7	"
All Prussia -----	7.5	"	Bavaria -----	4.	"
Lower Austria -----	6.	"			

The following table, compiled from the annual reports of the City Inspector, exhibits the average of deaths from small-pox, out of every 1000 deaths from all causes in the city of New-York, for periods specified, from the year 1805, when the first report was made, to the end of 1853. It will be observed that the mortality from small-pox here, where vaccination is also voluntary, coincides generally with the results observed in Table A :

	Deaths From Small-pox.	Deaths From all Causes.
For the 10 years ending 1815,	18.7 per	1,000
“ “ 10 “ “ 1825,	22. “	“
“ “ 10 “ “ 1835,	18.5 “	“
“ “ 10 “ “ 1845,	21.4 “	“
“ “ 9 “ “ 1853,	25.4 “	“

The highest ratio of deaths from small-pox in New-York occurred in 1824, when it amounted to 96.3 per 1,000 deaths from all causes; in 1853 the ratio per 1,000 was 32.23, which has been exceeded nine different years since the first report was made.

An inspection of the above tables reveals the significant fact, that, in those countries where vaccination is made compulsory, the proportionate mortality from small-pox is considerably less than half what it is where it is entirely voluntary, as in our own commercial metropolis. It must be borne in mind, that in many of the countries comprised in the second table, where vaccination is enforced by direct compulsion, by fine, &c., the public vaccinations occur but once a year; it necessarily happens that a number of the children are several months, or even more than a year old, before an opportunity is offered them of being vaccinated; and in those states where vaccination is only indirectly compelled, by making it an indispensable preliminary to admission to public schools, alms-houses, orphan asylums, &c., it may be deferred many years. The importance of this consideration is very obvious, when we remember that in England and Wales the proportion of deaths from small-pox under one year is 25 per cent., and in Paris considerably upwards of 14 per cent., and there is but little doubt, if proper regulations existed with regard to the age at which the operation should be performed, in the countries where it is directly or indirectly compulsory, the mortality might be still farther reduced. In proof of this statement, we are informed by Dr. Watson, in his valuable lectures, that, in Denmark, "Variola had at one time disappeared before the defensive influence of compelled vaccination;" but that "chance and a careless security, engendered by the absence of the pest, have led to its re-introduction there."

In view of the facts which have now been presented, is it surprising that, fifty-eight years after the discovery of vaccination, which was justly hailed as the greatest boon ever bestowed on man, we find small-pox committing such fear-

ful ravages in our midst? Indeed, is it not rather a matter of wonder that small-pox is not more prevalent? And what stronger evidence do we require than has been offered of the reckless neglect of vaccination, and of the great importance to society of making it compulsory?

The causes which induce this inattention to vaccination are ignorance and apathy, as well as the prejudice of some, who, without a sufficient examination of the facts, regard it as an inefficient safeguard. If they have seen one case, and heard of several others who have been vaccinated, and subsequently contracted small-pox, this is deemed ample evidence of the worthlessness of vaccination. Such individuals might, with the same propriety, abjure quinia as a remedy for ague, because it occasionally fails to arrest the disease. A melancholy instance of the effect of prejudice against vaccination has recently occurred in New-York, and was related to me by my friend Dr. Purple. A lady, who had no confidence in the protective power of vaccination, purposely exposed her children (four in number) to the contagion of small-pox, in order that they might have the disease at once, and thus relieve her from future anxiety. The calamitous result was, that three died, victims of the folly and prejudice of their doting, but deluded parent.

A *second* cause of the recent prevalence of small-pox is imperfect vaccination. Such unfortunately has been the want of attention to this important subject, that the salutary cautions of Jenner have been overlooked or entirely disregarded, and it has become a matter of importance, again briefly to call attention to them. It may result (1) from not observing the regular progress of the vaccine disease. Unfortunately, the opportunity of watching every stage of vaccination, which is absolutely necessary in order to arrive at correct opinions upon the case, is often denied to medical men; but this, which is unquestionably one of the fruitful causes of small-pox after (supposed) protection, might be obviated to a great extent, if the family physician would exercise his influence in impressing its great importance. If the

insertion of lymph into the arm is followed by the development of a vesicle, or even an ulcer, the unprofessional are often ready at once to conclude that cow-pox has been produced, and that the attention of a medical man is not longer necessary, when in truth no one, who is not thoroughly and intimately acquainted with the disease, is competent, or should be permitted, to decide so important a question. The illustrious author of vaccination, at an early period of its history, enforced, by frequent admonition, the necessity of a *particular* knowledge of cow-pox to the vaccine inoculator. "He should not only be acquainted with the laws and agencies of the vaccine virus on the constitution," says Dr. Jenner, "but with those of the variolous also, as they often interfere with each other. A general knowledge of the subject is not sufficient to enable or to warrant a person to practice vaccine inoculation; he should possess a particular knowledge; and that which I wish strongly to inculcate, as the great foundation of the whole, is an intimate acquaintance with the character of the true and genuine vaccine pustule (vesicle); the spurious pustule (vesicle), would then be more readily detected, whatever form it might assume, and errors known no more."

In our public vaccine institutions, it is customary to examine the vesicle but once, (and this is frequently not permitted,) and decide from that, whether the genuine disease is developed or not. This most reprehensible custom has been adopted, I presume, without acknowledging its propriety, because it is impossible to induce persons to return, or to convince the class who go there of the importance of observing regularly the different stages of the disease, in order to determine whether true vaccine has been developed. The following admonition of a distinguished authority, Dr. Labatt, is well worthy our consideration:—"Although the cow-pox be a mild disease, and the mode of inoculation apparently simple, yet a previous knowledge of the complaint is not the less necessary; and, indeed, the comparative mildness of it has led many to suppose that it is sufficient to ex-

amine the patient once or twice after inoculation. I am however, convinced, that unless every stage of the complaint be strictly attended to, we cannot give a correct opinion upon the case. It should be recollect that ‘there are gradations in the state of the vaccine vesicle, from that slight deviation from the usual course which is of no consequence, up to that which affords no security at all,’ and which can only be distinguished by closely watching the arm through the whole progress of the vesicle.” (*Vide Address on Vaccination*, p. 15. Dublin, 1840.) The Committee of the Provincial Medical and Surgical Association, in speaking of the tests for determining the true vaccine disease, observe that “the first to which we would advert is the regular progress of the vaccine vesicle, and we would lay it down as an axiom never to be forgotten, that no one is qualified to speak of its effective character who has not, at suitable periods, noticed this progress.” (*Transactions of Prov. Med. and Surg. Association*, vol. iii.)

In a majority of instances the vaccine disease undoubtedly pursues its regular course; in others, however, no effect has been produced; and, in a still larger proportion, a spurious disease has been developed, sufficiently analogous to the genuine, to lull the parents of the child into a false state of security, which leaves it in a more perilous situation, from the variolous infection, than it was at first. The security of the public depends so much upon the regular development of the vaccine disease, that the inspection of the vaccinated, at regular periods, should not only be insisted on as a matter of the highest importance, but actually enforced by legal enactment. A slight deviation is at first observed, which gradually becomes greater—therefore, the least deviation from the normal vesicle should at once demand our attention.

(2.) Vaccination may fail in consequence of want of attention to the state of the recipient. The influence of cutaneous diseases, especially on the progress of the vaccine vesicle, is urged by all authorities on the subject of vaccination, and yet how often is the admonition disregarded! At a very

early period in the history of vaccination, Dr. Jenner observed the effect of cutaneous eruptions in deranging the character of the vaccine disease, and called the attention of his followers to its importance. In one of his unpublished letters, (quoted by the Committee of the Provincial Med. and Surg. Association,) he observes, that "the greatest of all impediments to correct vaccination is that which arises from an herpetic state of the skin; indeed, compared with this, all the rest are as dust in the balance; and when the rules which I have again and again laid down respecting this point, and for so long a period, are attended to, then, and not till then, will the confidence of the public be fully established as to its preventive power." In another place, the Committee observe, that, "among those of our correspondents who have had most experience, and whose success has been most uniform, we find unequivocal testimony to the accuracy of Jenner's doctrine on this head. Many have made no observation at all respecting it; while some mention dentition, general ill health, scrofula, &c., as impediments to vaccination."

An impression, unfortunate in its effects for the reputation of vaccination, is, that when pure ~~vaccinal~~ lymph is used, genuine cow-pox will be developed, regardless of the state of the recipient. This opinion is a prolific source of evil consequences. Examples are often met with in practice, where the purest cow-pox lymph may, from circumstances connected with the state of the patient at the time, produce an imperfect vesicle. "I have seen infection from the same source," observes Dr. Labatt, "produce in one child a genuine, in another a spurious vesicle, and, in a third, fail altogether."

Not only is a disregard of the state of the recipient, at the time of the operation, a common cause of the failure of vaccination to afford protection, but such patients are also fruitful sources of spurious lymph, which exerts an extensive deleterious influence, by the false security which it affords to others to whom it is applied.

(3.) Another cause which, it is said, may render the anti-

variolous power of vaccination imperfect, is the breaking the vesicle in the early stage of its forming. It was a rule established at a very early period, that one or more vesicles should be allowed to run their course without being in any way disturbed, in order to ensure their full protective influence. The weight of evidence is still in favor of the observation of this canon. Dr. Labatt, whose great experience entitles his observations to much respect, says, "when one puncture has been made, and of course there is but one vesicle, I would be disposed to let it run its course uninterrupted, lest, by injuring its structure, we interfere with the regular course of the disease, and prevent the completion of the anti-variolous process." Dr. Baron also insists on leaving one or more vesicles to run their course, without being in any way disturbed, and the late Dr. Chapman inculcated similar views.

On the other hand, M. Bousquet, whose zeal and experience in the practice of vaccination are well known and justly appreciated, argues, that if the full effect of vaccination is obtained on the fifth or sixth day, it can be a matter of very little moment whether the vesicles are left untouched or not. He has also appealed to experiment; having opened the vesicles, he has applied the nitrate of silver to the bottom, so as to put a stop to the local process. He has then re-vaccinated the children, and not in a single instance succeeded. (*Traité de la Vaccine et des Eruptions Varioleuses ou Varioliformes.*) Similar views are, it is presumed, very prevalent here, as it is almost a universal custom among private practitioners, and in some of the public vaccine institutions, to produce but one vesicle, and puncture that at the proper time, for the purpose of obtaining lymph.\*

A serious objection to producing but one vesicle, and depriving that of the lymph it contains, independently of the

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\* Dr. J. Lewis Smith, of the Northwestern Dispensary, has informed me that he does not lacerate the vesicle, because he is inclined to think its protective power would thus be lessened.

possibility of its impairing the constitutional protection, is, that we cannot afterwards determine so well the true character of the disease; in order to do this, as we have elsewhere said, the progress of the vesicle must be watched through its different stages; if two vesicles are produced, and one should be deranged by accident or puncture, the other enables us to decide its character.

(4.) It is alleged that the protective power of the vaccine disease may be imperfect from performing the operation at too early an age, that is, before the system is sufficiently developed to receive the infection perfect; this is considered to take place about the fourth month; and yet, if we are allowed to judge from the susceptibility of the infant to small-pox at an earlier age, this opinion is not based upon correct observation. It appears, from the Registrar-General's second report, that in 1839 the deaths from small-pox in England amounted to 8,714, of which as many as 202 were within the first month, 181 in the second, 162 in the third, and 456 in the fourth month, making 1,001, or 11 per cent. of the whole number under four months. In the official reports made in the country, the ages under one year are not specified, but I have been informed by Dr. Hyatt of the New-York City Inspector's Office, that deaths from small-pox are sometimes reported as early as the second or third week, and it is a well-known fact, that the foetus in utero is not exempt from variola. These results teach us the importance of not delaying the operation unnecessarily. Indeed, during the epidemic prevalence of small-pox, or when unavoidably exposed, it may be practised within the month, if the infant have sufficient plumpness to allow the insertion of the virus. If however vaccination should be practised so early in life, in order to ensure complete protection, its subsequent repetition, say about the fourth month, as is usually advised, should not be omitted.

(5.) Imperfect vaccination may be the result of the use of virus, which is not in its most perfect form, on account of being taken before it is sufficiently elaborated, or after the

areola has formed. It is considered a good general rule not to take lymph before the eighth day, when the vesicle has usually attained nearly, if not quite its full size, and it was a golden rule of Dr. Jenner, never to take virus after the efflorescence appears.

(6.) Dr. Stephen Brown, of New-York, has, in his prize essay on small-pox, called attention especially to the influence of the phlegmatic temperament in preventing the prophylactic powers of the vaccine disease. "It is a fact," remarks the doctor, "well known to every practitioner of much observation, during the epidemics of small-pox, which have recently occurred in this city, that in some families all the children have had the varioloid, and in others one half of the children only have had it, while the other half escaped, although as fully exposed as those who became affected; while, in other families, we see all the children escape entirely, after such exposure to the variolous contagion as to render it certain that they are unsusceptible of its influence. Instead of looking for some external circumstance for accounting for these failures throughout a family, as *bad matter, improper mode of insertion, &c.*, we would refer the cause to *temperament*, more especially as these children were vaccinated successively in different years, and by different practitioners. It could not be expected, most certainly, that the causes heretofore considered by writers and practitioners as the true ones, and which might be avoided by a little attention, should be permitted to happen so generally in one family, while in other families of many children they do not occur in one instance.

"It is a very common circumstance to witness two distinct temperaments in the same family; this occurs when the father presents one temperament and the mother another; some of the children partake of the father's, others of the mother's." (*Vide Am. Medical Recorder, January, 1829.*)

This view of Dr. Brown, although of no real practical value, is interesting, because it enables us to explain the cause of

occasional failures of vaccination, which might have unjustly impaired its reputation.

(7.) It has been asserted that vaccine lymph, in passing indefinitely through a vast number of individuals, with all due care and selection, has suffered an essential diminution in its anti-variolous property; and hence, that this is a frequent cause of small-pox after vaccination.

M. Bousquet, in comparing the vaccine of 1836 with that from which it was derived in 1800, by the aid of a colored engraving, clearly shows a positive diminution of intensity, and explicitly states that the course is changed; from this he infers a failing efficiency in the vaccine. Dr. Gregory, of London, has also observed a "diminished intensity" in the vaccine lymph, and expresses the opinion that, in passing through the bodies of many persons, it loses in process of time some essential portion of its activity. Other high authorities entertain similar opinions, which are contrary to former belief, as well as a most respectable weight of evidence of the present day.

Dr. Jenner declares that there is "every reason to expect that its effects will remain unaltered, and that we shall not be under the necessity of seeking fresh lymph from the cow." The Committee of the Provincial Med. and Surg. Association conclude that vaccine lymph does not necessarily become deteriorated, though it may have passed through a great number of subjects, and have been used for a great number of years. And the National Vaccine Establishment of England also maintains that vaccine lymph retains its protective property throughout, and in their Report for 1839, it is stated that they prefer the vaccine lymph derived from the original virus furnished by Dr. Jenner, and which has been in use forty years, to any which may have been taken recently from the cow.

We may more readily arrive at a conclusion on this subject, by inquiring what is requisite, in order that vaccine lymph should be pure and perfect. It is manifestly of the first importance that it should come from a vesicle which has been

regular and complete—that the state of the recipient, with regard to the condition of the skin and other constitutional peculiarities, should have offered no impediment to the regular course of the disease; in a word, that every care should have been taken to preserve its perfect integrity. Now, when we remember the numerous causes detailed above, which it is conceded may impair the protective value of vaccination, and that much of the lymph in use, (as there is great reason to believe,) is derived from such sources, I cannot forbear uttering the conviction, that not only are the individuals who furnish such lymph imperfectly protected, but that the lymph itself is more or less deteriorated.

The virus which I have recently been using is the 180th remove from the cow, and was furnished me by my friend, Dr. C. L. Mitchell, of this city, who obtained it of Dr. J. Otis Pond, of New-York. Dr. P. has informed me that it is the portion of a stock obtained through a friend, from a physician of Bristol, England, who had been employed to procure fresh virus for the London Vaccine Institution, which he did by variolating the sturk. Dr. Pond was supplied from the 18th remove, and from the care which he has exercised in keeping a registry of all vaccinations, rejecting virus from any except perfect pustules in healthy infants, we may infer that it is now uncontaminated.

In order to determine more accurately the difference in the effects of this virus, and that which has long been current in man, I have used both, simultaneously applied at different points in the same subject, and have invariably found the vesicle produced by that recently from the cow developed with more certainty, and its local action more analogous to that described by Jenner. This also coincides with the experience of Dr. Mitchell, and is further corroborated by the observations of Dr. Marvin, another distinguished physician of this city, both of whom have used virus from the same source for five or six years. If the test I have just mentioned could be more generally applied, I cannot doubt but that much of the prejudice recently excited against vac-

cination, in consequence of its failures, would be ascribed to the proper cause, viz., deteriorated lymph.

A *third* cause of the recent prevalence of small-pox is *epidemic influence*. The origin of variola is universally admitted to be a specific contagion. But that some other influence occasionally co-operates with contagion in producing this, as well as other diseases of analogous origin, is evinced by the fact that, although scarcely a week passes without some deaths occurring from small-pox, it only occasionally occurs as an epidemic, and then attacks many who have been frequently exposed to the contagion on former occasions without effect. What the origin or essential nature of this unknown influence is, cannot be determined in the present state of our knowledge ; its effects, however, we are sufficiently familiar with. In the earlier ages of the world it was attributed to the anger of the gods. In later times its origin has been ascribed, with scarcely more reason, to some mysterious astral or meteoric agency ; whilst others maintain that it is produced by lethiferous agents which are extricated from the earth by the convulsions of nature. It is scarcely necessary to say that these explanations are purely hypothetical. We might indulge in much curious and interesting, but unprofitable speculation upon this subject, but we can only say with certainty that there must be some distempered condition of the physical agents around us, which occasionally generates a stronger predisposition to the disease than exists under other circumstances ; and this, which we call epidemic influence, added to contagion, causes many individuals to be attacked with small-pox, to whom in ordinary seasons the vaccine disease would afford a sufficient security.

Although we know absolutely nothing of the origin or real nature of epidemic influence, we can observe its effects, and to some extent understand the laws which control its mysterious operations. And it behoves us to prepare for future aggressions of this epidemic influence by the exercise of proper care and vigilance in vaccination, thus depriving it of the

pabulum with which it has so recently, and is now satiating its gluttonous appetite.

A fourth cause of the recent epidemic is the neglect of re-vaccination. It is impossible to say with accuracy how far this may have contributed to the late prevalence of small-pox, because we cannot determine to what extent it has been neglected, nor can we say positively in any given case of small-pox that re-vaccination would have averted it. We may, however, by examining the question of its necessity, be able to conjecture with some probability how much it might have contributed to the prevention of the disease.

The distinguished Dr. Gregory has promulgated opinions on the subject of re-vaccination, which, as I think, are not only at variance with well-established facts, but, from the high position he occupies, are calculated to effect serious harm; it becomes, therefore, a matter of grave importance to bring in review briefly some of the facts bearing on this subject.

In a discussion which took place before the Royal Med. and Chirurg. Society (vide *London Lancet*, March 8th, 1851), Dr. Gregory stated that, up to fifteen, the protection afforded by re-vaccination was as great as that afforded by inoculation all through life. After fifteen the system was subject to another law. "With respect to the question," he goes on to say, "as to whether re-vaccination after fifteen renewed the protection, he might answer, that in his opinion re-vaccination was a proceeding of very little moment. It satisfied the mind of the public rather than effected any real good. If it satisfied the mind, why should it not be performed? Let it be so by all manner of means, but not under the impression that it afforded any protection." Had we no other evidence of the importance of re-vaccination, that derived from the results of the operations in the Prussian army would be sufficient. Before re-vaccination was enforced, the different military stations were a prey to variolous disease, which has now almost entirely disappeared. From the Report of 1849, we find that 51,637 individuals were re-vaccinated, and only 62 cases of variolous disease occurred throughout that year, of which 9

were genuine variola, 24 varioloid or modified small-pox, and 13 varicella. One case only was fatal. A recruit, vaccinated when a child, had not yet been re-vaccinated, and died on the 10th day. (*Am. J. of Med. Sci.*, vol. xxi., p. 479.) But we need not traverse the ocean to find evidence of the importance of re-vaccination. Our own country furnishes no statistical data on this subject, but occasional cases must have been witnessed, by almost every practitioner who has seen much of small-pox, illustrating the value of this precaution.

In advocating re-vaccination, it must not be implied that it is the writer's opinion that the protective power of vaccination extends to a limited number of years, and that afterwards the individual is again susceptible to variola. This question may still be considered as *sub judice*. Nor do we believe that a successful re-vaccination proves that the individual who has been subject to it is thus shown to have lost his vaccine protection, and consequently to have been liable to small-pox infection. Its importance is urged from other considerations, some of which will now be mentioned. (1.) We have no means of determining whether the vaccination was correctly performed; whether the development of the disease was regular and complete, and whether the condition of the patient was such as that no impediment was presented to the regular course of the affection. These it is impossible to know unless you have regularly and carefully watched the course of the disease, or have repeated the operation with genuine virus until there remains no longer a susceptibility to the vaccine impression, as was long since suggested, or applied ~~to~~ the well-known beautiful and ingenious test of Mr. Bryce. Even exposure to the contagion of variola with impunity, although it affords strong presumptive evidence, is not a positive assurance that the individual is protected by vaccination, because we occasionally meet with persons who have from time to time resisted the usual influence of contagious diseases, but finally have succumbed. A still less reliable evidence of perfect vaccination is the appearance of the scar, which, according to some of the most experienced observers,

offers nothing characteristic. (2.) As the permanent influence even of duly conducted vaccination, is by no means a settled point, and as re-vaccination can do no harm, and may afford security from a most loathsome if not dangerous disease, we can see no possible reason why it should not be practised universally. If the following rule, laid down by the Committee of the Prov. Med. and Surg. Association, were generally acted on, I imagine we should hear much less of variola after vaccination :

*"All cases of reputed vaccination, unless they have passed under the review of a competent judge, who has witnessed the different stages of the affection, should be considered as no vaccination."*

"Until this canon be universally admitted and acted upon," the Committee go on to say, "we shall never have attained the complete security that vaccination is capable of affording. Failures may still occur, but they will neither be so numerous nor so fatal as they have been reported." It has been urged that if re-vaccination be looked upon as essential, less attention will be paid by practitioners and parents to the first vaccination than its importance demands, under the impression that any imperfection would be rectified by the subsequent operation. It seems to me extremely improbable that physicians, or parents especially, would incur the risk of having their patients or children contract variola from a want of proper attention to vaccination, especially when its protective power, for a certain period at least, is so universally conceded."

From the materials presented in the preceding pages, and from other sources, the following conclusions may be legitimately deduced :

1st. That the recent extensive prevalence of small-pox in New-York may be, to a great extent, attributed to the *neglect of vaccination*.

2d. *To imperfect vaccination*, which may occur : (1.) From not observing the regular progress of the vaccine disease. (2.) From a want of proper regard to the state of the recipient. (3.) From injuring the vesicle. (4.) Performing the

operation at too early an age. (5.) Using lymph taken at an improper stage of the disease. (6.) Peculiarity of the temperament of the recipient. (7.) Vaccinating with lymph deteriorated by age, or any of the above causes.

3d. To epidemic influence.

4th. To a neglect of re-vaccination.

From the investigation we have made of the subject, our estimate of the immense value of vaccination is not only undiminished, but is positively increased, and we now feel more inclined to rally around the standard erected by the immortal Jenner, and vigorously to defend from the assaults of ignorance and prejudice the most brilliant triumph of modern medicine.

I cannot close this inquiry without urging in conclusion the importance of the establishment of a "National Vaccine Institution," on a broad and liberal plan, which should be so conducted as constantly to keep ample supplies of *pure* vaccine virus, (which can be easily obtained by variolating the cow,) with which, from the great facilities of communication that now exist, the most remote section of our widely extended country could be promptly supplied. It is a well-established fact that cow-pox can readily be produced by inoculating the cow with human small-pox-matter, and that lymph from this source develops in man a disease identical with that produced by casual small-pox. This experiment is said to have been successfully made so early as 1801, at the Veterinary College in Berlin. It was repeated in this country by Dr. Carpenter, of Philadelphia,\* Dr. McPhail, of Baltimore, now of this city, (*Balt. Med. and Surg. Journal*, vol. ii., p. 301,) and also by Dr. Martin, of Massachusetts, *Med. Examiner*, v. iv., p. 782. Dr. Basil Theile, of Kassan in Russia, (*Am. J. Med. Sci.*, N. S., v. ii., p. 467,) and Mr. Seely, of Aylesbury, in England, (*Trans. of Prov. Med. and Surg. Association*,) have also performed similar experiments. To the latter gentleman especially are we indebted for much valuable information.

\* Noticed in *Med. Recorder*, No. xxviii., p. 210.

on the whole subject of *Variolæ Vaccinæ*. With the lymph obtained from the variolated cows, each of the experimenters succeeded in developing in the human subject vaccine vesicles in the most complete and reliable manner.

Such an establishment as we have mentioned, together with legal enactments enforcing vaccination under severe penalties, would be of incalculable aid in the suppression, if not the extinction, of the most loathsome and hideous disease that ever afflicted mankind. In New-York, vaccination is freely offered, "without money and without price," and its importance has been recently urged in hand-bills by the mayor, and yet how many reject the gratuity, except when alarmed by epidemic small-pox ! and nothing less than legal compulsion will obviate the evil.

It is a matter of surprise that we are so far behind many of the less enlightened and more despotic countries of Europe on this subject, and that now, fifty-eight years after the discovery of vaccination, its importance remains to be urged. We might enter at large into the discussion of the propriety of compulsory vaccination, but we have already exceeded the limits at first contemplated. This question may, however, be examined at a future time.

GREENE AVENUE, BROOKLYN, April, 1854.



